What is claimed is:

1. A photoresist composition comprising a photoactive component and a resin binder comprising a polymer that comprises repeat units of 1) a photo-acid labile ester group that has an alicyclic moiety, the ester group present in an amount of from about 30 to 60 mole percent, based on total units of the polymer, and 2) a nitrile group present in an amount of from about 20 to 50 mole percent, based on total units of the polymer, and the polymer being at least substantially free of aromatic groups.

2. The photoresist of claim 1 wherein the alicyclic moiety is a bicyclic group.

3. The photoresist of claim 1 wherein the alicyclic moiety is a tricyclic group.

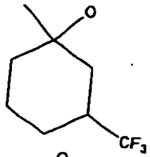
4. The photoresist of claim 1 wherein the alicyclic moiety is a monocyclic group.

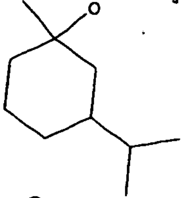
5. The photoresist of claim 1 wherein the alicyclic moiety is fenchyl, adamantyl, isobornyl, tricyclodecanyl, or pinanyl.

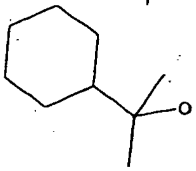
6. The photoresist of claim 1 wherein the alicyclic moiety is provided by reaction of 2-methyladamantyl methacrylate, 2-methyladamantyl acrylate, ethylfenchol methacrylate, ethylfenchol acrylate, 8-methyltricyclodecanyl methacrylate, or 8-methyltricyclodecanyl acrylate.

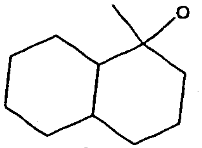
7. The photoresist of claim 1 wherein the nitrile group is provided by reaction of methacrylonitrile or acrylonitrile.

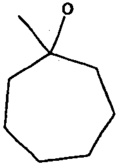
8. The photoresist of claim 1, wherein the alicyclic group corresponds to one of the following structures:

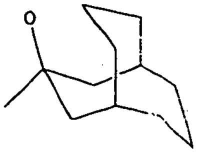


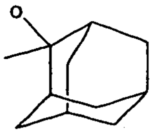


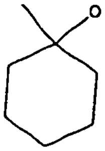


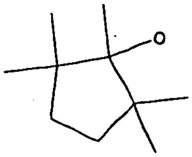


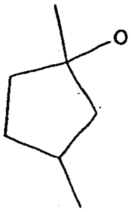


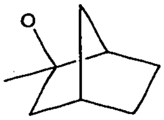


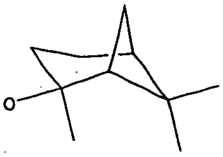


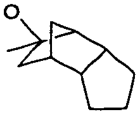


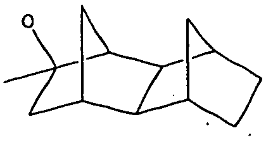


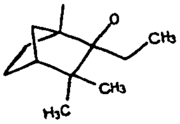












9. The photoresist of claim 1 wherein the alicyclic group has a molecular volume of at least about 125 Å^3.

10. The photoresist of claim 1 wherein the polymer further comprises one or more lactone units.

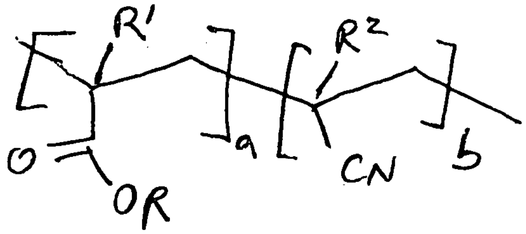
11. The photoresist of claim 1 wherein the polymer further comprises one or more units selected from the group consisting of an acid; an anhydride; a lactone; or a photoacid labile group that contains a leaving group that has other than an alicyclic moiety.

12. The photoresist of claim 1 wherein the ester group with alicyclic moiety is present in an amount of from 30 to 50 mole percent, based on total units of the polymer.

13. The photoresist of claim 1 wherein the nitrile group is present in an amount of from 20 to 50 mole percent, based on total units of the polymer.

14. The photoresist of claim 1 wherein the nitrile group is present in an amount of from 20 to 40 mole percent, based on total units of the polymer.

15. The photoresist of claim 1 wherein the polymer comprises units of the following Formula I:



I

wherein R is an alicyclic group;

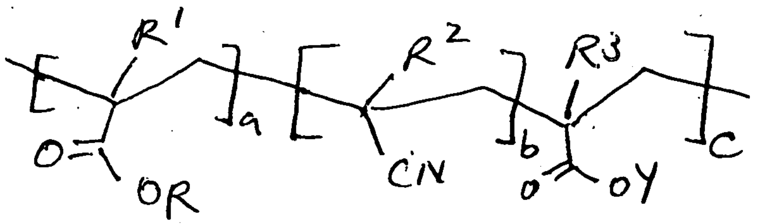
R^1 and R^2 are each independently hydrogen or optionally substituted alkyl;

a is from about 30 to about 60 mole percent based on total polymer units, and b is from about 20 to about 50 mole percent based on total polymer units.

16. The photoresist of claim 14 where R is a bridged bicyclic group.

17. The photoresist of claim 14 wherein R is optionally substituted ethylfencyl, optionally substituted adamantyl, optionally substituted isobornyl, optionally substituted tricyclodecanyl, or optionally substituted pinanyl.

18. The photoresist of claim 1 wherein the polymer comprises units of the following Formula II:



II

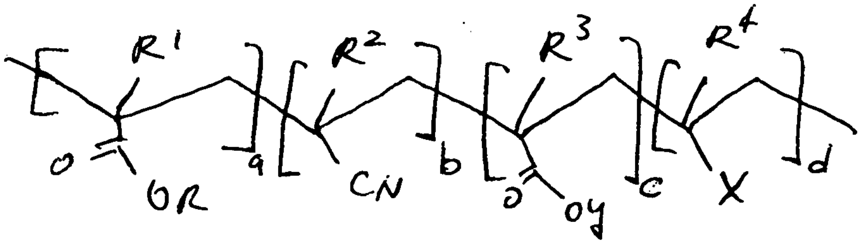
wherein R is an alicyclic group;

R^1, R^2 and R^3 are each independently hydrogen or C_{1-6} alkyl;

Y is hydrogen, optionally substituted alkyl, or optionally substituted alkoxy;

a is from about 30 to about 60 mole percent based on total polymer units, b from about 20 to about 50 mole percent based on total polymer units, and c is greater than 0 to about 50 mole percent based on total polymer units.

19. The photoresist of claim 1 wherein the polymer comprises units of the following Formula III:



III

wherein R is an alicyclic group;

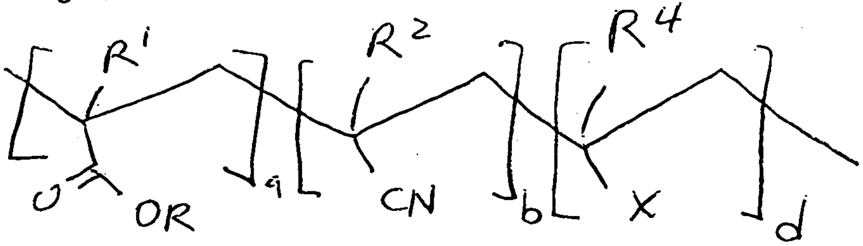
R^1, R^2, R^3 and R^4 are each independently hydrogen or C_{1-6} alkyl;

Y is hydrogen, optionally substituted alkyl, or optionally substituted alkoxy;

X is a lactone or anhydride group;

a is from about 30 to about 60 mole percent based on total polymer units, b is from about 20 to about 50 mole percent based on total polymer units, and c is from 0 to about 49 mole percent based on total polymer units; and d is from about 1 to about 50 mole percent based on total polymer units.

20. The photoresist of claim 1 wherein the polymer comprises units of the following Formula IIIA:



IIIA

wherein R is an alicyclic group;

R^1, R^2, and R^4 are each independently hydrogen or C_{1-6} alkyl;

X is a lactone group;

a is from about 30 to about 60 mole percent based on total polymer units, b is from about 20 to about 50 mole percent based on total polymer units; and d is greater than zero.

21. The photoresist of claim 1 wherein the polymer is completely free of aromatic groups.

22. The photoresist of claim 1 wherein the photoactive component is a photoacid generator compound that is activated by radiation having a wavelength of less than 200 nm.

23. A method of forming a positive photoresist relief image, comprising:

(a) applying a coating layer of a photoresist of claim 1 on a substrate; and

(b) exposing and developing the photoresist layer to yield a relief image.

24. The method of claim 23 wherein the photoresist layer is exposed with radiation having a wavelength of less than about 200 nm.

25. The method of claim 23 wherein the photoresist layer is exposed with radiation having a wavelength of about 193 nm.

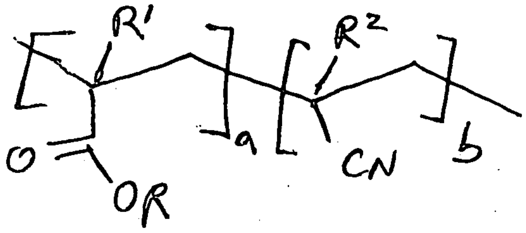
26. An article of manufacture comprising a microelectronic wafer substrate having coated thereon a layer of the photoresist composition of claim 1.

27. A polymer that comprises a polymer that comprises repeat units of 1) a photo-acid labile ester group having an alicyclic moiety, the ester group present in an amount of from about 30 to 60 mole percent, based on total units of the polymer, and 2) a nitrile group present in an amount of from about 20 to 50 mole percent, based on total units of the polymer, and the polymer being at least substantially free of aromatic groups.

28. The polymer of claim 27 wherein the polymer comprises from 30 to 60 mole percent of ester groups with an alicyclic moiety, from 20 to 50 mole percent of nitrile groups, and is completely free of aromatic groups.

29. The polymer of claim 27 wherein the polymer comprises from 30 to 50 mole percent of ester groups with an alicyclic moiety, from 20 to 40 mole percent of nitrile groups, and is completely free of aromatic groups.

30. A polymer of claim 27 that comprises units of the following Formula I:



wherein R is an alicyclic group;

R^1 and R^2 are each independently hydrogen or optionally substituted alkyl;

a is from 30 to 60 mole percent based on total polymer units, and b is from 20 to 50 mole percent based on total polymer units.

31. A compound selected from the group consisting of ethylfenchol methacrylate and ethylfenchol acrylate.